

Study/Objective: The aim of this presentation is to select key results learned from FP7 funded European projects on security research on the CBRNE field.

Background: International events remind us that Chemical, Biological, Radiologic, Nuclear, and Explosive (CBRNe) events can have multiple facets and can concern the civilian population. Our goal is to take care of victims and to keep the First Responders (FRs) safe while they perform their tasks at the scene and in hospitals. Recent events in Paris have impacted our way of understanding the suitability of our current countermeasures and demonstrated the accuracy of securing and increasing the FR's protection.

Methods: Several European projects, such as Extension Disaster Education Network (EDEN) and IFREACT, that we have been working on offered the opportunity to compare standard operational procedures (SOPs) in large field exercises and to test FR's protection means. In this presentation, EU project's innovations are highlighted in a medical aspect, in particular, the medical response in a CBRNE environment, from decision making on the scene to the care of victims in the hospitals.

Results: In all CBRNE situations, anticipation, adaptability, flexibility, and interoperability are the key goals to achieve. They rely on a doctrine which firstly implies situational awareness and information sharing between all the stakeholders. Secondly, it also includes safety measures and security issues for FRs with the adapted equipment and PPE (personal protective equipment) enabling decontamination procedures in a contaminated area. And thirdly, it provides safe health procedures with fast medical triage and treatment on the scene and in hospitals.

Conclusion: Increasing technology efficiency with user-friendly communication and detection tools, increasing the FR's safety and training with non-bulky PPE, and educating the population are key factors to improve SOPs and human behavior.

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The Role of Rapid Enzymatic Escharotomy and Eschar Removal in Burn Mass Casualty Incidents

Lior Rosenberg¹, Yaron Shoham², Adam Singer³

1. Plastic And Reconstructive Surgery Unit, Meir Medical Center, Kfar Saba/Israel
2. MediWound Ltd, Yavne/Israel
3. Stony Brook University, Stony Brook/NY/United States of America

Study/Objective: To present a rapid acting enzymatic debridement agent that can help overcome bottlenecks and increase surge capacity in the treatment of burn mass casualty incidents (BMCI).

Background: BMCI are quite common worldwide, and in developing countries have even been termed a silent epidemic. Agencies dealing with CBRN preparedness estimate that the detonation of a nuclear device in a major city will lead to thousands of conventional burn victims, in addition to other tragic results. Reducing dependency on scarce, highly trained surgical teams and surgical facilities is a major goal in preparedness for BMCI, as these are the main established bottlenecks.

Methods: NexoBrid (NXB) is an enzymatic debriding agent evaluated in numerous preclinical and clinical studies, proving its efficacy in removing burn eschar rapidly and selectively in a

single 4 hour application. NXB can be applied immediately on fresh burns indiscriminately of burn depth as it does not harm viable tissue, leading to significantly reduced needs for surgical facilities and blood loss. The clean wound bed can then be covered by dressings allowing for spontaneous healing or autografted as needed.

Results: NXB has been proved to be a rapid effective debriding agent. Early NXB debridement significantly reduces the surgical burden (surgical debridement, autografting and escharotomy) and the dependency on specialized personnel and facilities. Its use in a real BMCI has already been demonstrated after the Romanian nightclub fire in 2015. Additionally, a porcine study has also demonstrated NXB ability to debride Sulfur Mustard contaminated tissues.

Conclusion: NXB significantly reduces surgical burden thus offering a potential solution for first line escharotomy and eschar removal in BMCI.

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Mass Exposure to Hydrofluoric Acid and Response:

The Green Island Fire, New York

David Kassel¹, Gregory P. Wu¹, Michael W. Dailey², Kevin P. Collins¹, Molly Boyd³

1. Department Of Emergency Medicine, Albany Medical Center, Albany/NY/United States of America
2. Division Of Emergency Medical Services, Albany Medical Center, Albany/NY/United States of America
3. Division Of Medical Toxicology, Albany Medical Center, Albany/NY/United States of America

Study/Objective: This case study will evaluate a mass casualty disaster caused by Hydrofluoric Acid (HFA), as well as the importance of interdisciplinary coordination in dealing with such an event.

Background: HFA is an extremely toxic and widely used solvent in industry. Upon exposure, profound hypocalcemia, arrhythmias and multisystem failure can occur. In high concentrations of HFA, as little as 2.5% BSA exposure can be lethal. On November 3, 2015 during an industrial fire in Green Island, New York, 33 firefighters and employees were accidentally exposed to high concentration HFA when it was accidentally aerosolized in the process of extinguishing the fire.

Methods: Not Applicable

Results: Upon identification of the HFA exposure disaster protocols were initiated. Local emergency departments were notified, and the on scene physicians established an on-site command center. Decontamination sites were established on scene and at a nearby fire headquarters. Local providers were in close communication with all local hospitals involved. Numerous measures were performed to ensure readiness. This included clearing the Emergency Department of existing patients, assistance from hospitalists and trauma surgery, and triaging in the ED. Ad hoc standardized treatment protocols and order sets, were written for rapid patient evaluation and treatment. Pharmacy staff compounded calcium compounds for topical and intravenous administration. Patients underwent various interventions in the ED for their exposure.

These interventions included additional eye decontamination; select patients had nebulized calcium for respiratory distress, topical calcium for skin exposure, and IV calcium, and magnesium for EKG abnormalities. All were discharged home the next day.

Conclusion: This event exemplified how strong communication and planning helps control the impact of a mass casualty event. Having a strong interplay between an integrated incident command, EMS, Toxicology, Pharmacy, and EM physicians should all be built in to disaster planning to facilitate all-hazard preparedness and resilience.

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Necessity of Information Sharing System of Air Dose Levels to Secure enough Medical Teams within the Evacuation Zone in Nuclear Disasters

Masaru Ogasawara, Kazuma Morino, Hisayoshi Kondo

Department Of Emergency, Aomori Prefectural Central Hospital, Aomori-shi/Japan

Study/Objective: We investigate what becomes obstacles to ensure an adequate number of medical response teams, which are deployable to secure safe transport of patients to an alternative location in nuclear disaster.

Background: One hospital in Fukushima lost more than 10% of patients while transporting them in a traffic jam without medical attendance. Disaster Medical Assistance Teams (DMATs) don't have any duties in nuclear disaster.

Methods: A questionnaire survey was carried out to investigate awareness for a radiation emergency medicine among DMATs in Japan.

Results: DMAT members think that the special-educated DMATs for radiation will be a better relief team than REMATs (Radiation Emergency Medical Assistance Team) for hospital evacuation. REMATs are the only specialists of radiation dose evaluation; REMATs have a little knowledge of emergency medical care, and their human resource is poor. But DMATs also think that a majority of them do not want to be on-duty for nuclear power plant disasters. Their hesitation is made by the lack of dosage information at their working place. It affects their decision to dispatch adversely; if only a few data public monitoring posts are offered. But if the first comer DMAT measured the dose rate already, the next team will participate in medical activities. We also evaluated the usefulness of a new ultra-compact portable dosimeter. Once connected to a smartphone, the device works in conjunction with an application software and continues to take and store measured results automatically as digital data. It is also possible to visualize the measurements by automatically importing them to an enlargeable map for real-time information sharing. DMATs think this system will provide a sense of security to them.

Conclusion: Information dissemination on correct knowledge of radiation and timely sharing of data on radiation doses are required to ensure that enough medical response teams are deployable in the event of large-scale and complex disasters.

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Nuclear Disasters: Our Actual Medical Experience

Yoshikura Haraguchi

Disaster Medicine Compendium Group, Dept. Of Surgery, Keiyo Hospital, Tokyo/Japan

Study/Objective: We analyzed the medical team's roles, mainly based on actual experiences on site, against nuclear disasters.

Background: Repeated nuclear disasters were caused.

Methods: Fukushima Daiichi Nuclear Plant explosions, which followed a mega-disaster of the Higashinohon earthquake, the same level of the Chernobyl incident, is mainly focused, compared with other nuclear disasters: ie, The JCO criticality incident, 1999 (2 direct deaths), the Mihama nuclear plant's accident 2004 (ruptured secondary water cooling system, lead to 5 deaths), the Kashiwazaki-Kariwa plant damage in the Chuetsuoki earthquake, 2007 (no fatalities) in Japan, the Chernobyl incident, 1986 in Ukraine, etc.

Results: Although the medical role of a disaster surgeon is especially important during such mega-disasters, trauma doctors seemed useless in this nuclear disaster. Many serious problems were apparent, which are as follows: 1) Inappropriate basic preparedness and education against the special disaster (nuclear disaster), i.e most members of Japan DMAT team seemed to be laypersons. 2) Insufficient transporting system to the weak/vulnerable people. Many aged inpatients seemed to have survived if appropriate triage and smooth transportation system had been established. 3) The myth of 'absolute safety' of nuclear plants, which had been strongly declared before the mega-disaster. 4) Lack of long-term follow-up and care system, including mental support, detection of thyroid tumor, etc.

Conclusion: In order to cope with the mega and complex disasters, an academic approach from various points is also essential. It is insufficient to take makeshift measures or use cheap tricks. Moreover, the feeling of security and safety of people, or people's reliability is also important to protect the society. Philosophy during a mega-disaster should be reviewed, and the disaster medicine compendium should be realized to be important.

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Our Preparedness for Radiological Disaster as the City Suffered from the Atomic Bomb Attack, Japan

Yoshihiro Nozaki

Emergency Medical Center, Nagasaki University Hospital, Nagasaki/Japan

Study/Objective: Nagasaki University Hospital was designated as a core hospital for nuclear disaster in the west part Japan. Our purpose is to show the process of organizing the team and getting connected with several facilities around our hospital.

Background: Nagasaki Medical College, a predecessor of Nagasaki University Hospital, is the only medical university hospital which suffered in the atomic bomb attack. We have continued medical campaigns and research activities since August 9, 1945. In Japan, medical facilities are chosen and